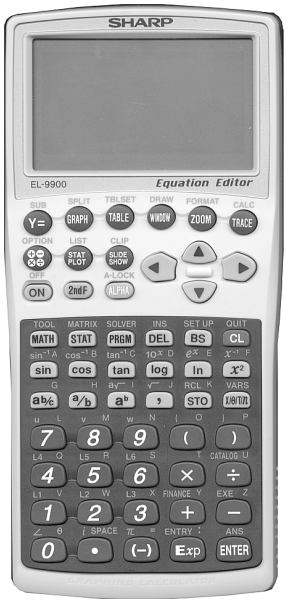
SHARP SERVICE MANUAL

CODE:00ZEL9900SM/E



Graphing calculator

MODEL EL-9900

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PARTS GUIDE

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

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The contents are subject to change without notice.

CHAPTER 1. SPECIFICATIONS

Model:	EL-9900
Product name:	Graphing Calculator
Display:	132 × 64 dot matrix liquid crystal display Number of digits: mantissa 10 digits, exponents 2 digits (standard screen); 7 digit display (including negatives, decimals) for table screen, split screen, etc. Mantissa of 10 digits in the complex number mode Display method: Numerical value, calculation equation input (direct algebraic logic input / one-line input method), fraction, and complex number display method specification.
Reversible keyboard:	Basic and Advanced Note: Advanced mode specific functions are: financial function, statistical test function and distribution function, solver function, matrix function, and tools function, etc.
Calculation method:	D.A.L. (Direct Algebraic Logic)
Calculation features:	Manual calculation (arithmetic, parentheses calculation, memory calculation, function calculation, integral calculation, coordinate conversion), binary/octal/decimal/hexadecimal calculation, Boolean operation, matrix calculation, complex number calculation, complex function calculation, statistic calculation, regression calculation, statistic authorization calculation, financial calculation, etc.
Input method:	Manual key entry
Graphic features:	Rectangular/polar/parametric/sequence coordinate graph Graph range specification, graph window mode automatic specification, graph plotting, trace, calculation function, zoom, picture input, paint, graph database register split-screen, etc.
Statistic features:	1-/2-variable statistical data input/calculation, register, edit and frequency input, regression calculation function, and estimated statistic/authorization function, etc.
Solver features:	Equation solver: numerical syntax analysis, Newton's method, graph analysis, and solver equation register.
List features:	Direct data entry/edit to list, calculation function for various lists, and list/matrix conversion.
Substitution features:	Graph drawing, numerical input from split-screen
Slide Show features:	Screen image capture, play function The maximum number of pages to be captured: Approx. 250 pages (pages equivalent to the $Y = X^2$ graph screen)
Program features:	Condition statement command, subroutine, graph, various function commands
Option menu:	Screen contrast adjustment, memory usage check, data delete, data link (between EL-9900 and PC or another EL-9900)
Memory size:	64 KB (user area: approx. 47.4 KB)
Power supply:	Operation: 6 V DC ⎓ AAA manganese battery (R03) x 4 Memory backup: 3 V DC ⎓ Lithium battery (CR2032) x 1
Automatic power-off:	Approx. 10 minutes
Operating temperature range:	0°C to 40°C (32°F to 104°F)
Power consumption:	0.23 W
Battery life:	Operation battery set: approx. 150 hours (with 5 minutes of continual use and 55 minutes in the display state for every hour at a temperature of approx. 20°C/68°F) Memory backup: approx. 5 years (at a temperature of approx. 20°C/68°F, and when the operation batteries are replaced frequently) Note: The life span may differ according to battery brand, type, usage, and ambient temperature.
External dimensions:	86 mm (W) × 183 mm (D) × 23 mm (H) 3-3/8" (W) × 7-7/32" (D) × 29/32" (H)
Weight:	240 g (0.53 lb) (with batteries, without the hard cover)
Accessories:	4 AAA manganese batteries (included), 1 lithium battery (installed), operation manual

Packing form

Form	SPEC	Country
Clamshell	U1E	SEC
Universal	Y12	SECL
	L1N	SEES,SEIS,Other
	LL1	SCA,Other
	L1Q	SEEG
	LGN	SEI

CHAPTER 2. NOTE FOR SERVICING

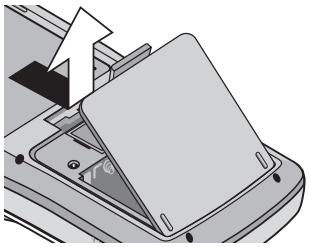
1. NOTE FOR SERVICING

- Be sure to back up the memory contents to another set before disassembling the set.
- For disassembly, remove six screws at the bottom cabinet, and remove the bottom cabinet from the upper cabinet.
- If soldering is made to the printed pattern of check pad, etc. in servicing, be sure to suck residual solder with a solder wick.
- Check for no solder on the reset key pattern, and the key pattern. Check for no foreign matters, either.
- Carefully handle the PWB unit, the LCD-PWB heat seal connection section.
- When assembling the bottom cabinet, be careful not to pinch the lead wire.
- Before disassembly and assembly of the set, be sure to use an earth band or other measures for prevention against static electricity.

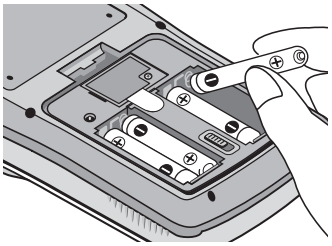
2. BEFORE USE

Inserting batteries and resetting the memory

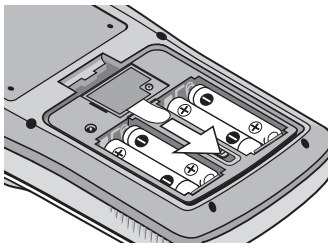
1. Open the battery cover located on the back of the calculator. Pull down the notch, then lift the battery cover up to remove it.



2. Insert the batteries, as indicated. Make sure that the batteries are inserted in the correct directions.



3. Pull off the insulation sheet from the memory backup battery.



4. Place the battery cover back, and make sure that the notch is snapped on.
5. Press [ON] and you will see the following message on the display:

   PRESS [CL] KEY TO CLEAR ALL DATA
   PRESS [ON] KEY TO CANCEL

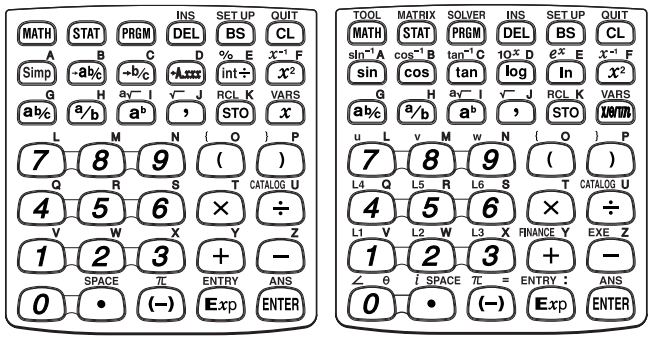
Note: If the above message does not appear, check the direction of the batteries and close the cover again. If this does not solve the problem, follow the instruction described in “5.Reset - 1.Using the reset switch” on page 4.

6. Press [CL] to reset the calculator's memory. The memory will be initialized. Press any key to set the calculator ready for normal calculation mode.

3. CHANGING THE KEYBOARD

This calculator is designed with a reversible keyboard, which by utilizing it will not only change the appearance, but will also change the internal functions and configurations of the calculator as well.

• Reversible Keyboard

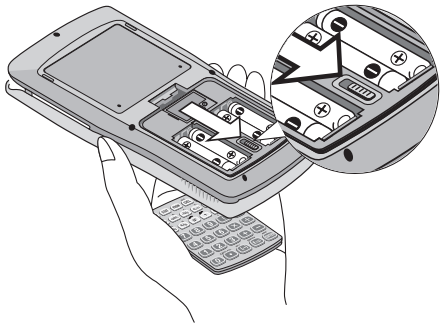


Basic keyboard
(Green background color)

Advanced keyboard
(Blue background color)

To change the keyboard

1. Press [2ndF] [OFF] to turn off the calculator's power.
2. Open the battery compartment cover.
   Hold the calculator as illustrated.
3. Slide the keyboard eject tab (KEYBOARD EJECT) down.
   The keyboard will be ejected.
   Be careful not to drop the keyboard on the floor, as this may damage it.



4. Turn the keyboard over, and replace in the calculator as illustrated. Secure by gently pressing the keyboard until you hear the notch click.

Note: Clean the edges and contact points of the keyboard and the keyboard tap before reattaching the keyboard to the main unit.
DO NOT touch the pad portion in the keyboard tap.

5. Replace the battery compartment cover.
6. Press [ON].
7. Make sure that the message shown on the screen.

```
PRESS [CL] KEY TO
CLEAR ALL DATA

PRESS [ON] KEY TO
CANCEL
```

8. Press [ON].

When you reverse the keyboard, the following settings are automatically changed.

Basic → Advanced

- Simplifying: Auto (Auto at SIMPLE in SETUP menu)

Advanced → Basic

- Coordinate system: Rectangular coordinates (Rect at COORD in SETUP menu.)
- Answer mode: Displays a mixed number if ANSWER is set to complex numbers.
- Angle unit: Set to Deg if DRG is set to Grad.
- Decimal format: Set to FloatPt if FSE is set to Eng.

4. LOW BATTERY DETECTION CIRCUIT SPECIFICATIONS

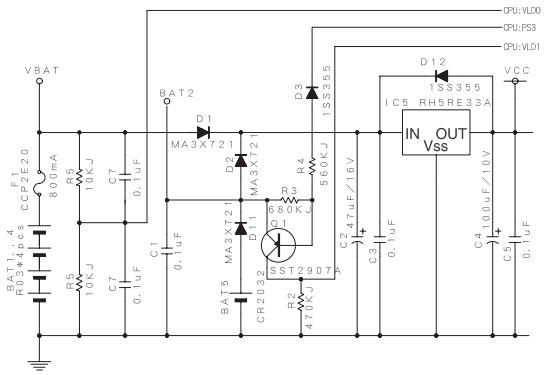
4-1. Introduction

The EL-9900 is provided with the low battery detection circuit in order to warn the replacement timing of the operation battery and to prevent against overuse of the operation battery. It is also provided with the battery detection circuit to confirm installation of the memory back-up battery.

The EL-9900 detects the operation battery voltage in two steps. If the operation battery voltage reaches the CAUTION level, the message to urge replacement of the operation battery is displayed when the machine is booted by [ON] key next time. If the operation battery voltage falls to reach the FATAL level, the system is turned off. When the system is turned off, [ON] key and the reset switch do not function.
Also if the battery cover is opened when replacing the battery, the system is automatically turned off.

The EL-9900 detects installation of the memory back-up battery. If the memory back-up battery reaches the detection level, the message to urge replacement of the memory back-up battery is displayed when the machine is booted by [ON] key next time.

4-2. Low battery detection circuit



4-3. Low battery detection circuit operation time chart

Detection of the CAUTION level of the operation battery is performed by detecting the voltage of VBAT x (R11÷(R10+R11)) at VLD0 pin (CPU). When VBAT reaches the CAUTION level during use of the machine, the CAUTION level is detected at VLD0 pin (CPU) and the message to urge replacement of the operation battery is displayed when the machine is booted by [ON] key next time. The message remains displayed until any is pressed. (This state is canceled by replacing the operation battery according to the Operation Manual.)
Detection of the FATAL level of the operation battery is performed by detecting the voltage of VBAT x (R11÷(R10+R11)) at VLD0 pin (CPU). When VBAT reaches the FATAL level during use of the machine, the FATAL level is detected at VLD0 pin (CPU) and the system is turned off to prevent against further use of the operation battery. After that, the machine cannot be booted by [ON] key and cannot be reset. (To use the machine, replace the operation battery according to the Operation Manual.)

Detection of the memory back-up battery is performed by outputting LOW from P53 pin (CPU) when booting the machine and detecting it at VLD1 pin (CPU). When BAT2 reaches the detection level, it is detected at VLD1 pin (CPU) and the message to urge replacement of the memory back-up battery is displayed when booting the machine by [ON] key. The message remains displayed until any key is pressed. (This state is canceled by replacing the memory back-up battery according to the Operation Manual.) Though it is possible to use the machine with the message displayed, the contents of memory may be deleted.)

4-4. Low battery warning specifications

CONDITION		Display / Operation
GOOD CONDITION		Normal operation
CAUTION LEVEL	When booting by [ON] key	When booting the machine by [ON] key, the following message is displayed. The message remains displayed until any is pressed. 〈ATTENTION〉 The OPERATING batteries are depleted • Read OPERATION MANUAL for detail.
	During use	When booting the machine by [ON] key, the above message is displayed. The message remains displayed until any is pressed.
FATAL LEVEL	When booting by [ON] key	[ON] key does not function. The machine cannot be booted.
	During use	The system is turned off.
Without memory back-up battery	When booting by [ON] key	When booting the machine by [ON] key, the following message is displayed. The message remains displayed until any is pressed. 〈ATTENTION〉 The BACKUP battery is depleted. Read OPERATION MANUAL for detail.

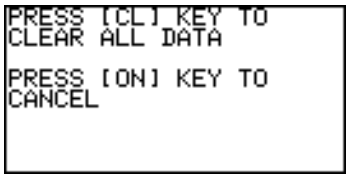
5. RESET

Use the reset when a malfunction occurs, to delete all data, or to set all mode values to the default settings. The resetting can be done by either pressing the reset switch located in the battery compartment, or by selecting the reset in the OPTION menu.

Resetting the calculator's memory will erase all data stored by the user; proceed with caution.

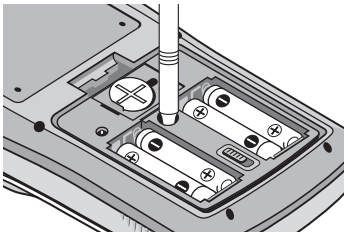
5-1. Using the reset switch

1. Pull down the notch to open the battery cover located on the back of the calculator.
2. Place the battery cover back until the notch is snapped on.
3. Press [ON].
   The verification window will appear on the screen.

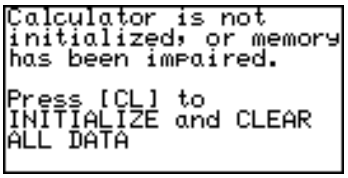


4. Press [CL] to clear all the stored data. Press [ON] to cancel resetting. After [CL] is pressed, the calculator's memory will be initialized.
   Press any key to display the calculation screen.

Note: If the above verification window does not appear, remove the battery cover and gently push the RESET switch with the tip of a ball-point pen or a similar object.
DO NOT use a tip of a pencil or mechanical pencil, a broken lead may cause a damage to the button mechanism.

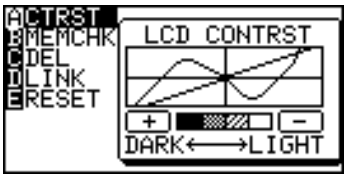


- The message on the screen may occasionally appear. In this case, repeat the procedure from step 1 to prevent loss of data.



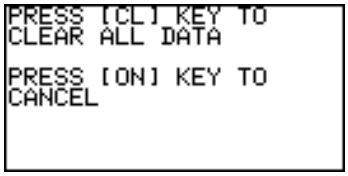
5-2. Selecting the RESET within the OPTION menu

1. Press [2ndF], then [OPTION].
   The OPTION menu appears.



2. While in the OPTION menu, press [E] to select “E RESET”; the RESET sub menu items should appear on the right side of the screen.

3. The first item “1 default set” will initialize only the SETUP and FORMAT settings, while the second item “2 All memory” will erase all memory contents and settings. To reset the memory, select “2 All memory” by pressing [2]. The verification window will appear.
4. Press the [CL] key to clear all data stored on the calculator.
   Press any key to continue.



6. REPLACING BATTERIES

The calculator uses two different kinds of batteries: manganese (AAA) for unit operation, and lithium (CR2032) for memory backup.

Compatible battery types

Type (use)	Model	Quantity
Manganese battery (for unit operation)	AAA	4
Lithium battery (for memory backup)	CR2032	1

∗ To prevent loss of stored data, DO NOT remove both the unit operation and memory backup batteries at the same time.

6-1. Precautions for handling batteries

- Fluid from a leaking battery accidentally entering an eye could result in serious injury. Should this occur, wash with clean water and immediately consult a doctor.

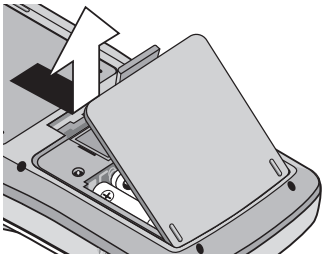
- Should fluid from a leaking battery come into contact with your skin or clothes, immediately wash with clean water.
- If the product is not to be used for some time, to avoid damage to the unit from leaking batteries, remove them and store in a safe place.
- Do not leave exhausted batteries inside the product.
- Do not fit partially used batteries, and be sure not to mix different batteries types.
- Keep batteries out of the reach of children.
- Do not allow batteries to become completely exhausted; doing so may cause the batteries to leak, and may damage the calculator's hardware.
- Do not throw batteries into a fire or water, as this may cause them to explode.

6-2. Procedures for replacing unit operation batteries

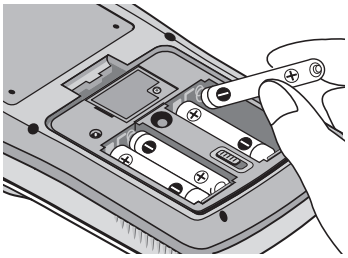
When battery power becomes low, a message will show indicating that a new set of batteries are needed.

```
<ATTENTION>
The OPERATING
batteries are depleted
.
Read OPERATION MANUAL
for detail.
```

1. Turn off the calculator's power (2ndF OFF).
2. Turn over the calculator.
   Locate the battery compartment cover, and open the cover as illustrated.



3. Replace all four AAA batteries as illustrated.



4. Replace the battery compartment cover.
5. Press ON .
   The following message will appear.
   If the message does not appear, repeat the procedures from step 2.

```
PRESS [CL] KEY TO
CLEAR ALL DATA

PRESS [ON] KEY TO
CANCEL
```

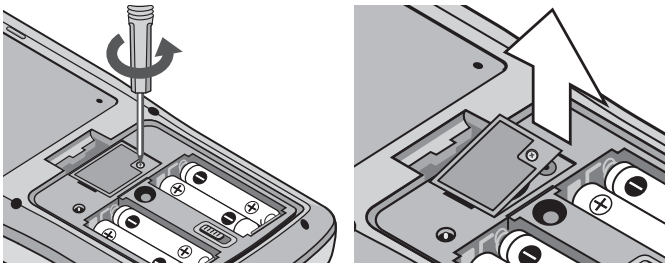
6. Press ON .
   Do not press CL . This will clear all the data.

6-3. Replacing the memory backup battery

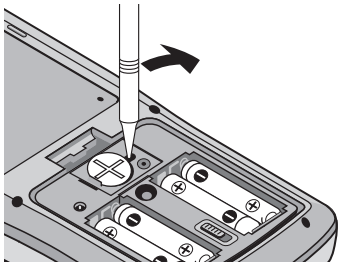
Once every 5 years, the lithium battery will need to be replaced.
The lithium battery is used to maintain the memory of the calculator.

Note: Do not remove the lithium battery while the unit operation batteries are removed; otherwise all the calculator's stored memory will be lost.

1. Perform procedures 1 and 2, as shown above. Do not remove the unit operation batteries.
2. Remove the screw and the lithium battery cover, as shown.



3. Use a pen to lift the lithium battery out of the battery compartment.



4. Insert the new battery with the PLUS (+) side facing up.
5. Replace the lithium battery cover and fasten the screw.
6. Replace the battery compartment cover and press ON .
   The following message will appear.

```
PRESS [CL] KEY TO
CLEAR ALL DATA

PRESS [ON] KEY TO
CANCEL
```

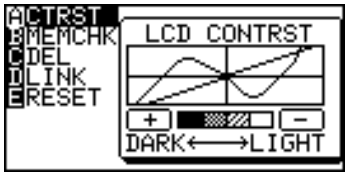
7. Press ON .
   ∗ Do not press CL . This will clear all the data.

7. DISPLAY CONTRAST ADJUSTMENT AND MEMORY USAGE CHECK

The calculator is equipped with OPTION menu for adjusting the display contrast, checking memory usage, deleting stored data, transferring data, and resetting the calculator's memory.

7-1. Accessing the OPTION Menu

Press [2ndF] [OPTION].
The OPTION Menu will appear.



A: Adjusts the display contrast

B: Checks the memory usage

C: Deletes files

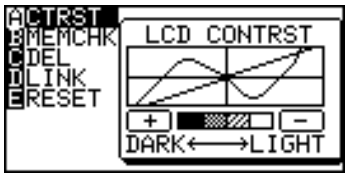
D: Link command to use with another calculator or PC.

E: Resets the calculator

7-2. Display contrust adjustment

Since the display contrast may vary with the ambient temperature and/or remaining battery power, you may want to adjust the contrast accordingly. Here's how:

1. Press [2ndF], then [OPTION].



2. Adjust the contrast by using the [+] and [−] keys.

   [+] : increases the contrast
   [−] : decreases the contrast

3. When done, press [CL] to exit the mode.

7-3. Memory usage check

The memory usage window enables you to check how much memory you have used.
If the memory is nearly full, delete files or reset the calculator to operate safely.

1. Press [2ndF] [OPTION].
2. Press [B].
   The memory check window will appear. The remaining number of bytes of user memory will be shown on the display.
   The user memory is used to store data for graph equations, graph screens, matrices, lists and so on.

3. If you want check the details, press [ENTER].
   The detailed memory usage window will appear.
   The total remaining memory will appear on the bottom line of the screen.

4. Press [▼] to scroll the window.

List	The amount of memory (bytes) used by lists
Matrix	The amount of memory (bytes) used by matrices
Graph Eqn	The amount of memory (bytes) used by graph equations
Solver Eqn	The amount of memory (bytes) used by solver equations
Program	The amount of memory (bytes) used by program files
Picture	The amount of memory (bytes) used by graph pictures
G_Data	The amount of memory (bytes) used by stored graph data
L_Data	The amount of memory (bytes) used by stored list data
Slide	The amount of memory (bytes) used by slide shows the user has created

8. DATA COMMUNICATION IN SERVICING

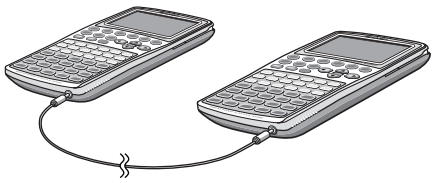
8-1. General

Using the optional CE-451L or CE-LK2, the EL-9900 can be linked to another EL-9900 or PC, respectively.

To transfer data, press [2ndF] [OPTION] [D] to open the Link option window. Press [1] to send data and press [2] to receive data.

8-2. Transmission between EL-9900's

1. Connect the calculators securely using the optional CE-451L communication cable.
   - Make sure the communication cable is firmly inserted into the ports of both calculators.



∗ Use the CE-451L only for linking two EL-9900's.
The EL-9900 can only be linked to another EL-9900.

2. Press [2ndF] [OPTION] [D] on both calculators.
3. Press [2] on the receiving machine.
   The receive mode screen will appear on the display.

4. Press [1] on the sending machine.
5. The send menu will appear on the display. Specify the data to send from the following categories.

A SELECT:	Displays the menu window to send the data specified as follows:
01 ALL	Displays a list of all the stored files category by category.
02 List	Displays a list of all the stored list files.
03 Matirx	Displays a list of all the stored matrix files.
04 Graph Eqn	Displays a list of all the stored graph equations.
05 Solver Eqn	Displays a list of all the stored solver equations.
06 Program	Displays a list of all the stored program files.
07 G_Data	Displays a list of all the stored graph data files.
08 L_Data	Displays a list of all the stored list data files.
09 Picture	Displays a list of all the stored picture files.
10 Slide	Displays a list of all the user-made slide show data.
11 A - Z, θ	Displays a list of variables A to Z and θ.
B BACKUP:	Send all the data stored in the calculator memory.

6. Select the item to send using [▲] / [▼] and pressing [ENTER].
   A "✱" will be placed by the selected item.
7. Press [2ndF] [ENTER] to send.
8. Transmission begins and a busy message will appear on the displays of the both calculators.

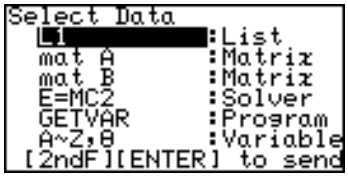
- An data in the same memory locations in the receiver will be automatically overwritten.
- Up to 10 files can be selected to send at once.

[Example]

If you wish to send the list "L1", matrices "mat A" and "mat B" and graph equation "Y2" to the other calculator.

1. Prepare the receiving calculator by pressing [2ndF] [OPTION] [D] [2].
2. Press [2ndF] [OPTION] [D] [1] on the sending calculator.
   The send menu will appear.

3. Press [0] [1].
   A list of all the data stored will be are displayed and the cursor positioned on the top line.
   - You can also select ⌈02 List⌋ for "L1", ⌈03 Matrix⌋ for "mat A" and "mat B", and ⌈04 Graph Eqn⌋ for "Y2", for example, and send the data category by category.
4. Move the cursor to L1 and press [ENTER].
   A "✱" mark will flash to the left of "L1", indicating that the item has been selected to be sent.
   Press [ENTER] again to deselect.



5. Select the other files you wish to send in the same manner.
6. Press [2ndF] [ENTER] to start transmission.

8-3. Transmission between the EL-9900 and PC

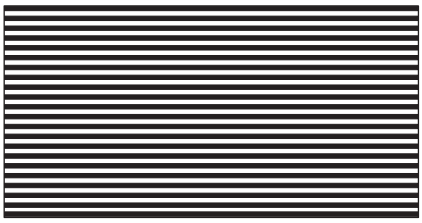
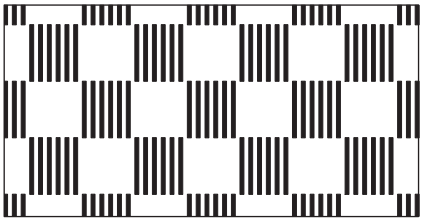
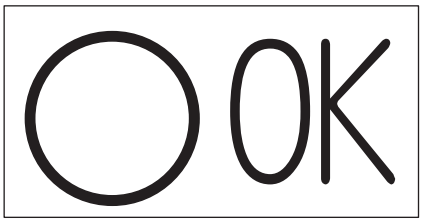
- The optional kit CE-LK2 (cable and Windows software) is required for calculator to data communication with PC.
- Refer to the CE-LK2 operation manual for details.
- During communications between calculator and PC, no operation of the calculator is required. Just connect the cable and press the power on key, and the entire operation can be controlled from the PC.

9. SELF CHECK

Before self check, save the data into another unit or put them on paper.

9-1. Diag procedure

No.	Operation	Display	Check item
1	① Set the key unit to Surface B (Blue). ② The main battery and the backup battery are installed. Check to confirm the above two items. Press and hold [2ndF] key and [x/θ/T/η] key, and close the battery cover.	(a) EL-9900 Ver □.□□ Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B CONT : A Page : 1 ∗1 ∗2 ∗3	Check that the display (a) is shown. ∗1. Check that the version is □.□□. (Refer to the 9-3.Note (Version and CHECK SUM)) ∗2. Check that Key Type is B. ∗3. Check that Contrast is A. If the display (a) is not shown, press and hold [ON] key and press RESET switch. Then perform procedure No.1 again. If the display (a) would not be shown by that, it is "NG".
2	Press [+] key 10 times.	(b) EL-9900 Ver □.□□ Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B CONT : J Page : 1 ∗4	Check that the display becomes darker. ∗4. Check that Contrast is J.
3	Press [-] key 20 times.	(c) EL-9900 Ver □.□□ Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B CONT : 4 Page : 1 ∗5	Check that the display becomes lighter. ∗5. Check that Contrast is 4.
4	Contrast adjustment Adjust Contrast to the proper level.	(d) EL-9900 Ver □.□□ Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B CONT : ◯ Page : 1 ∗6	Check that Contrast can be adjusted. ∗6. Check that Contrast is adjusted to the range of 5 ~ I. If not, "NG". Contrast adjustment range is of 16 steps as shown below: Light → [4], [5], [6], [7], [8], [9], [A], [B], [C], [D], [E], [F], [G], [H], [I], [J] ← Dark
5	Press [1] key.	(e) 	Check that the display (e) is shown. ∗ Only the external frame (1Dot) is displayed.
6	Press [Enter] key.	(f) 	Check that the display (f) is shown. ∗ All light up

No.	Operation	Display	Check item
7	Press [Enter] key.	(g) 	Check that the display (g) is shown. ∗ Cross-stitch display 1
8	Press [Enter] key.	(h) 	Check that the display (h) is shown. ∗ Cross-stitch display 2 (Reversal of cross-stitch 1)
9	Press [Enter] key.	(i) 	Check that the display (i) is shown. ∗ Horizontal stripe
10	Press [Enter] key.	(j) 	Check that the display (j) is shown. ∗ Rain fall
11	Press [Enter] key.	(k) ∗ROM OK! ∗(△△△△h) ∗7	Check that the display (k) is shown. ∗ Check that ROM check is successfully completed. ∗7. Check that CHECK SUM is △△△△ h. (Refer to the 9-3.Note (Version and CHECK SUM))
12	Press [Enter] key.	(l) ∗ ROM OK! ∗ (△△△△ h) ∗ ROMVer [.] ∗	Check that the display (l) is shown.
13	Enter the ROM version. (Example) In the case of version 1.02, enter [1], [0], and [2].	(m) 	Check that the display (m) is shown. ∗ If "✕NG" is displayed, it is “NG”. ∗ If a wrong figure is entered, resume from No. 2.

No.	Operation	Display	Check item
14	Press [Enter] key.	(n) ＊ ROM OK! ＊ (△△△△h) ＊ ROMVer [□. □□] OK! ＊	Check that the display (n) is shown. ＊ If "×NG" is displayed, it is “NG”.
15	Press [Enter] key.	(o) RAM CHECK ○ OK	Check that the display (o) is shown.
16	Press [Enter] key.	(p) RAM CHECK ＊ ROM OK! ＊ (△△△△h) ＊ ROMVer [□ .□□] OK! ＊ ＊ ROM OK! ＊ 128kbytes	Check that the display (p) is shown. ＊ Check that RAM is of 128kbytes.
17	Press [Enter] key.	(q) KEY CHECK ＊8	Check that the display (q) is shown. ＊8. The key pattern corresponding to the key arrangement is displayed in the circle.
18	Press all the keys.	(r) KEY CHECK ■■■■■■ ○ OK	Check that the display (r) is shown.
19	Press [Enter] key.	(s) 3PIN CHECK Press [Enter]	Check that the display (s) is shown.
20	Connect the master unit and the CE-451L. For setup of the master unit, refer to “9-2 Master unit setup.”	(t) 3PIN CHECK Press [Enter]	Check that the display is not changed.

No.	Operation	Display	Check item
21	Press [Enter] key.	(u) ○ OK	Check that the display (u) is shown. ∗ For NG criteria, refer to the figures below.
	3PIN CHECK × NG If the display on the left is shown, it is “NG”.	3PIN CHECK Send to MASTER Recv from MASTER	If the message on the left is shown for 10sec, check the following possible causes: ① Cables are not connected properly. ② Damaged cable ③ Communication failure. • Check and fix the cables and repeat from No. 2. If the same result is obtained, it is “NG”.
22	Press [Enter] key.	(v) EL-9900 Ver □.□□ Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B CONT : A Page : 1	Check that the display (v) is shown. ∗ Contrast rank is adjusted rank on procedure No.4
23	Press [▼] key twice.	(w) EL-9900 Ver □.□□ ESD Menu 1:WRITE RAM 2:READ RAM 3:WRITE/READ RAM 4:READ MEMORY KEY : B 5:W. RAM/R. MEM CONT : A 6:FROM WRITE Page : ③ ∗9	Check that the display (w) is shown. ∗9 Check that "Page: 3" is displayed.
24	Press [6] key. (Wait for several seconds.)	(x) FROM WRITE CHECK ○ OK	Check that the display (x) is shown. ∗ For NG criteria, refer to the figures below.
	FROM WRITE CHECK × NG If "X NG" is displayed as above, it is “NG”.	FROM WRITE CHECK WRITE AND VERIFY If the above display is not changed for several seconds, it is “NG”.	FROM WRITE CHECK ERASE WRITE PAGE
25	Press [Enter] key.	(y) EL-9900 Ver □.□□ ESD Menu 1:WRITE RAM 2:READ RAM 3:WRITE/READ RAM 4:READ MEMORY KEY : B 5:W. RAM/R. MEM CONT : A 6:FROM WRITE Page : 3	Check that the display (y) is shown.

No.	Operation	Display	Check item
26	Open the battery cover, and set the key unit to Surface A (Green).	(z) EL-9900 Ver □.□□ ESD Menu 1:WRITE RAM 2:READ RAM 3:WRITE/READ RAM 4:READ MEMORY KEY : A ∗10 5:W.RAM/R.MEM CONT : A 6:FROM WRITE Page : 3	Check that the display (z) is shown. ∗10.Check that the key type is A.
27	Press RESET switch.	(A)	Check that the display is turned off.
28	Remove the battery.		

9-2 Master unit set up

No.	Operation	Display	Check item
1	Set the key unit to B surface (Blue), and install four batteries (6.0V). Press and hold [2ndF] key and [X/θ/T/η] key and close the battery cover.	EL-9900 Ver □.□□ ∗1 Main Menu 1:DIAG 2:AGING FAST 3:AGING SLOW 4:LB CHECK KEY : B ∗2 CONT : A ∗3 Page : 1	Check that the display (a) is shown. ∗1. Version must be □.□□ ← Refer to the 9-3. Note (Version and CHECK SUM) ∗2. Check that Key Type is B. ∗3. Check that Contrast is A. If the display (a) is not shown, press and hold [ON] key and press RESET Switch simultaneously. Then repeat procedure No.1. If the display (a) is not shown again, it is NG.
2	Press [▼] key.	(a) EL-9900 Ver □.□□ SIO Check Menu 1:Send H 2:Send and Recv 3:Recv and Send 4:MASTER KEY : B 5:3PIN CHECK CONT : A Page : 1	Check that the display (b) is shown.
3	Press [4] key.	(c) EL-9900 Ver □.□□ SIO CHECK MASTER MODE	If the display (c) is shown, setup of the master unit is completed.
	EL-9900 Ver □.□□ SIO CHECK NG	If the display on the left is shown by a communication error, press [CL] key to return to the display (c).	

9-3. NOTE (Version and CHECK SUM)

Version	CHECK SUM
1.02	30FEh

9-4. Current check and the low battery check.

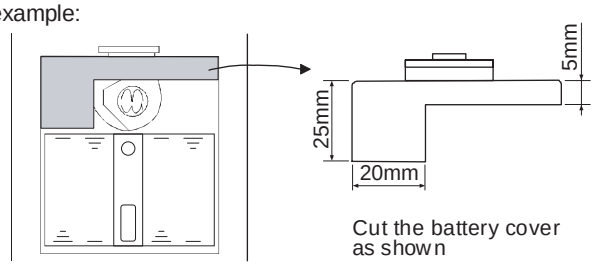
[Caution]

- Before check of the current and low battery, be sure to save the memory content to another unit.

[Necessary tools]

SW1 holding jig (To operate the EL-9900, SW1 must be pressed.)

For example:



(At that time, connect the main battery of 6.0V and backup battery of 3.0V to the set then attach the SW1 holding jig.)

Press “RESET” switch.

The display shows “PRESS [CL] KEY TO CLEAR ALL DATA
PRESS [ON] KEY TO CANCEL”.

Press “CL” key.

The display shows “ALL DATA CLEARED
PRESS ANY KEY”. Press “CL” key.

In this mode, measure the current during displaying.

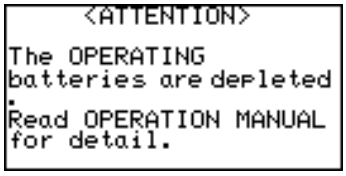
Press “2ndF” → “OFF” keys to measure the current during OFF.

Then press “ON” key.

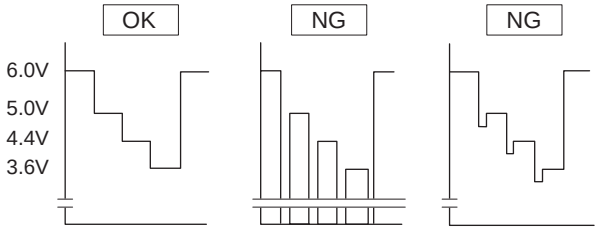
Then set the main battery voltage from 6.0V to 5.0V, press “2ndF” → “OFF” → “ON” key, and check that “_” is displayed at the left upper corner.

Set the main battery voltage from 5.0V to 4.4V , press “2ndF” → “OFF” → “ON” key, and check that the display (Fig-1) is shown. Press “CL” key.

Set the main battery voltage from 4.4V to 3.6V, press “ON” key and check that the set is not turned on.



(Fig-1)



(Fig-2)

In this case, the power voltage waveform must not be broken as shown in the figure (Fig-2).

Under this state, set the main battery voltage (+) from 6.0V to 0V, then measure the backup current after 5 sec or more.

Current specifications

Displaying current	350µA or less
OFF current	40µA or less
B/U current	3µA or above ~ 25µA or less

9-5. Clock Accuracy Check

With the set completely set (with the batteries installed), check that the advancement is within the range below:

–3.0 ~ 0.0 sec/day
(conduction: Check environment temperature = 20 ~ 30°C)

9-6. Memory backup battery contact check

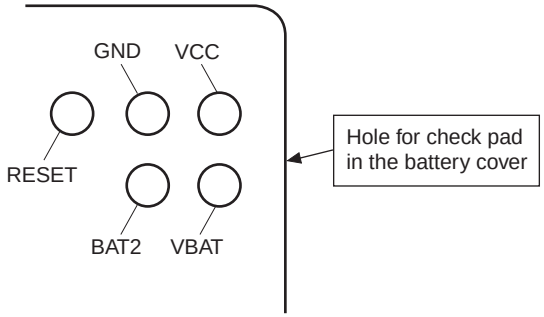
① Install the operating battery and the memory backup battery.

② Close the battery cover and perform the data initialize operation. (Close the battery cover. → Same as pressing the reset SW.)

③ Open the battery cover.

④ Use the check pad between BAT2 and GND to measure the backup battery voltage with a circuit tester.

Specifications: BAT2 > 2.9V (at 20 ~ 30°C)

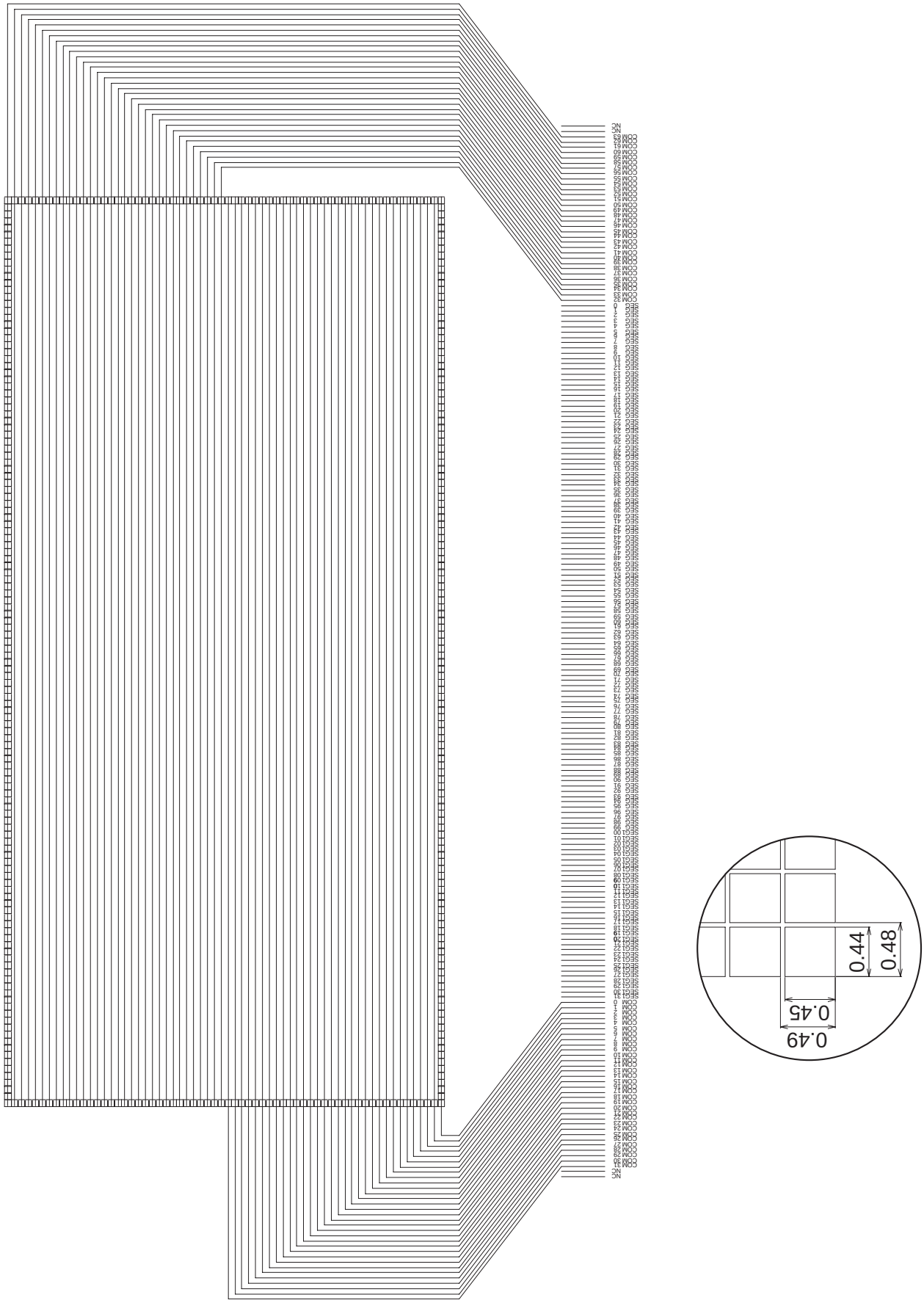


∗ When the memory backup battery is first installed, the system may be hung up. Never leave the unit only with the memory backup battery. (When the operating battery is installed and resetting is once made, there is no problem.)

CHAPTER 3. CIRCUIT DIAGRAM & PARTS LAYOUT

1. LCD

1-1. COMMON



1-2. SEGMENT

NC
NC
COM31
COM30
COM29
COM28
COM27
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COM25
COM24
COM23
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COM12
COM11
COM10
COM 9
COM 8
COM 7
COM 6
COM 5
COM 4
COM 3
COM 2
COM 1
COM 0
SEG 131
SEG 130
SEG 129
SEG 128
SEG 127
SEG 126
SEG 125
SEG 124
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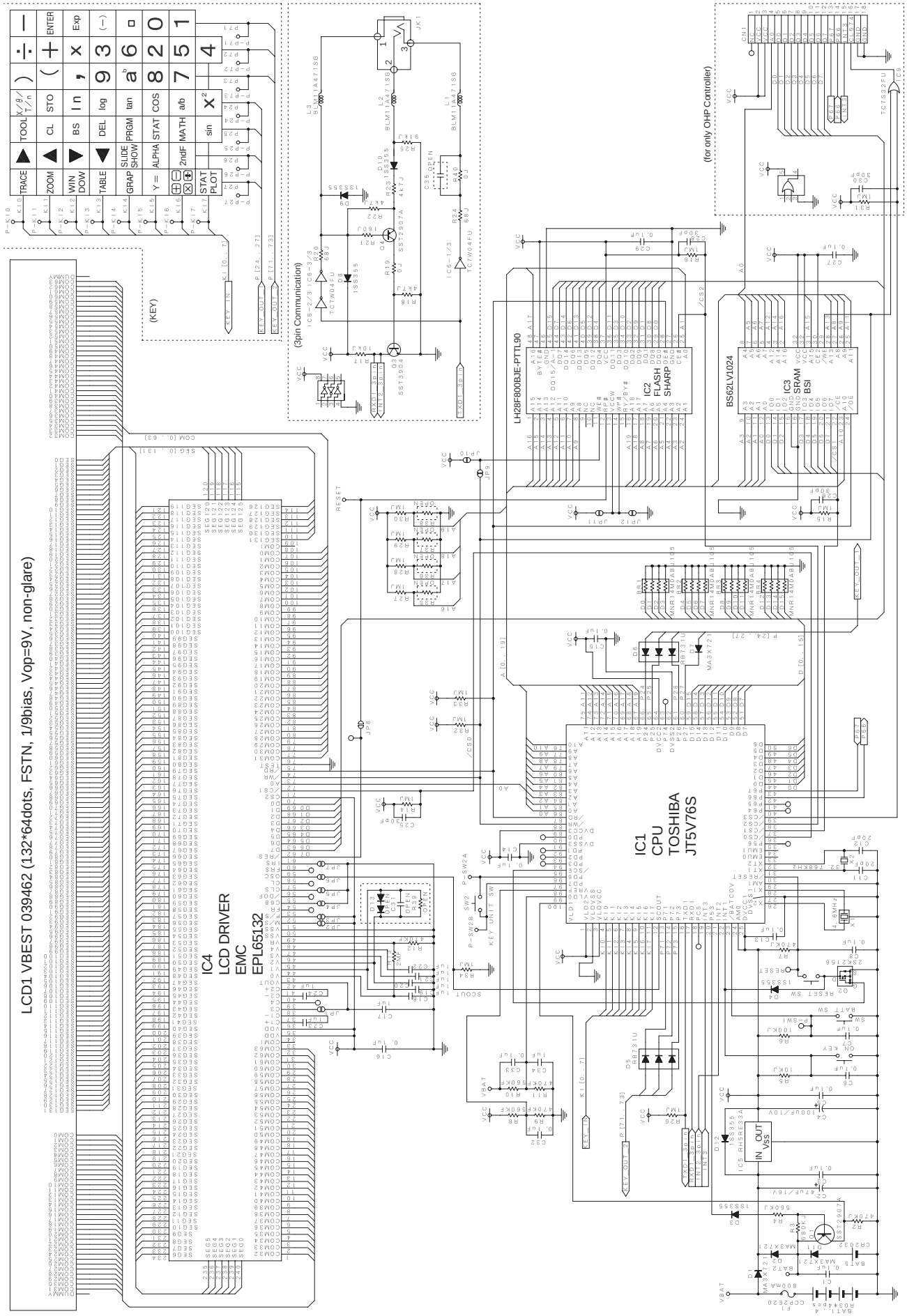
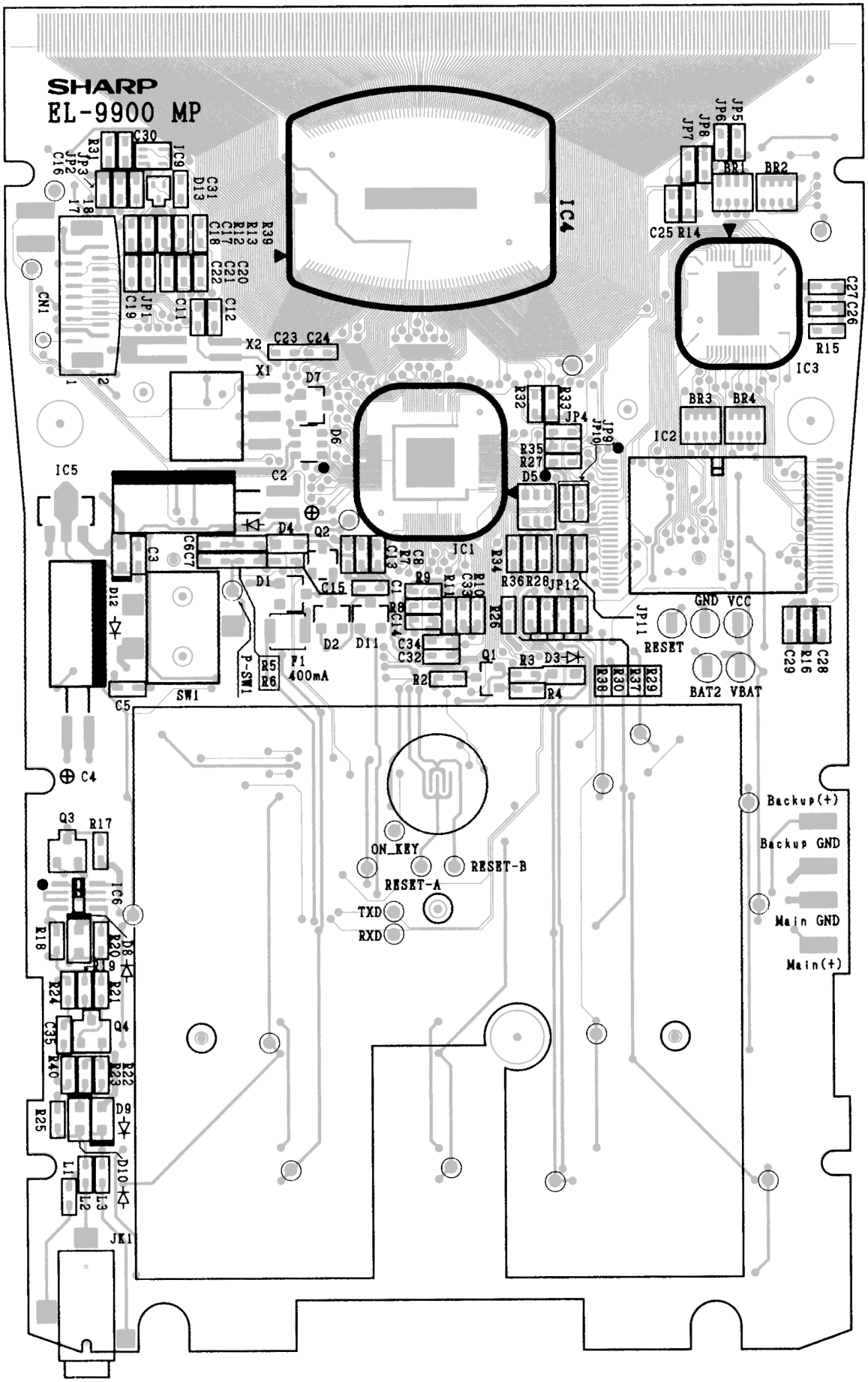
COM63
NC
NC

2. CIRCUIT DIAGRAM

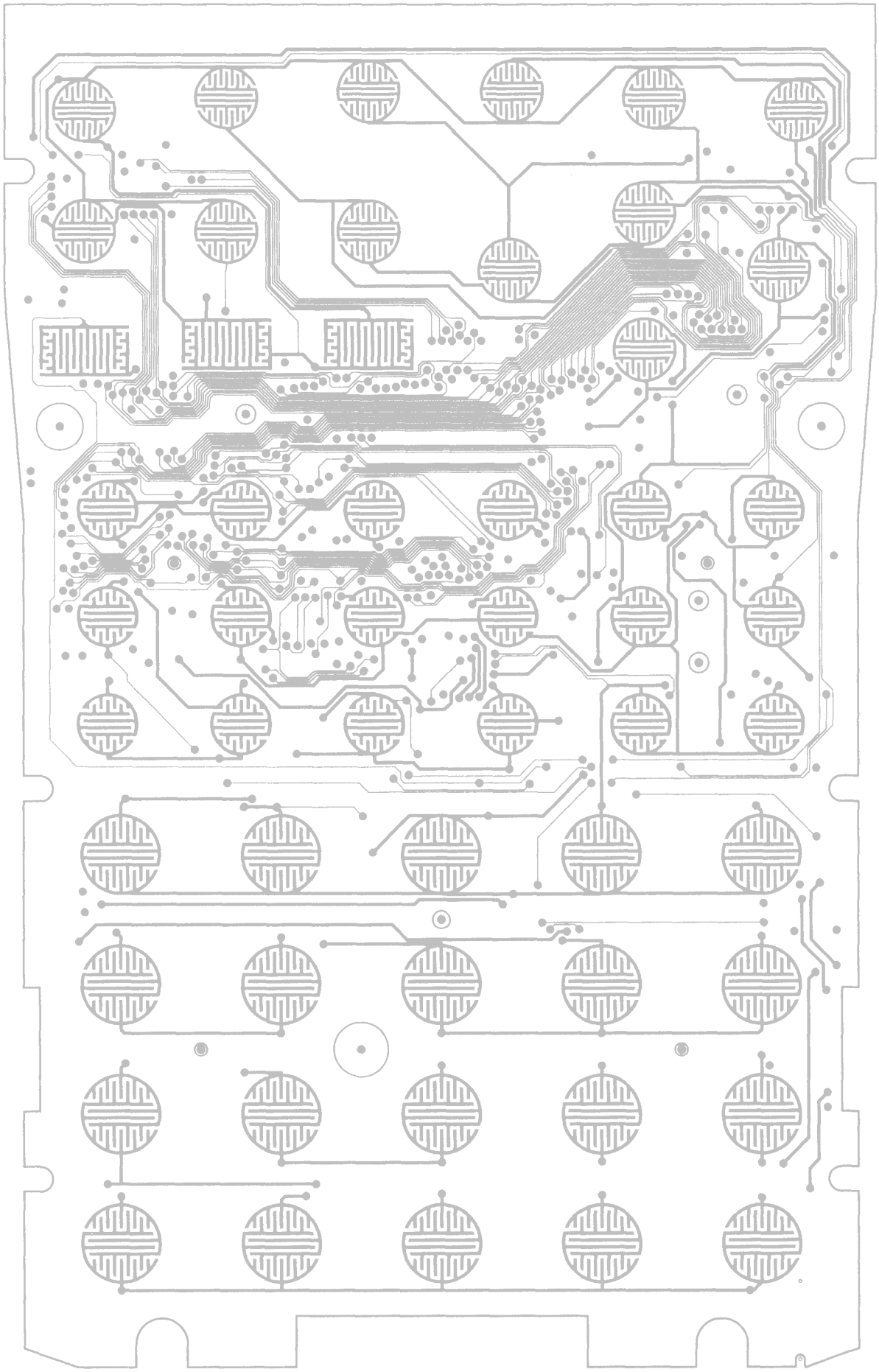


3. PARTS LAYOUT

3-1. Parts / Signal pads layout (MP)

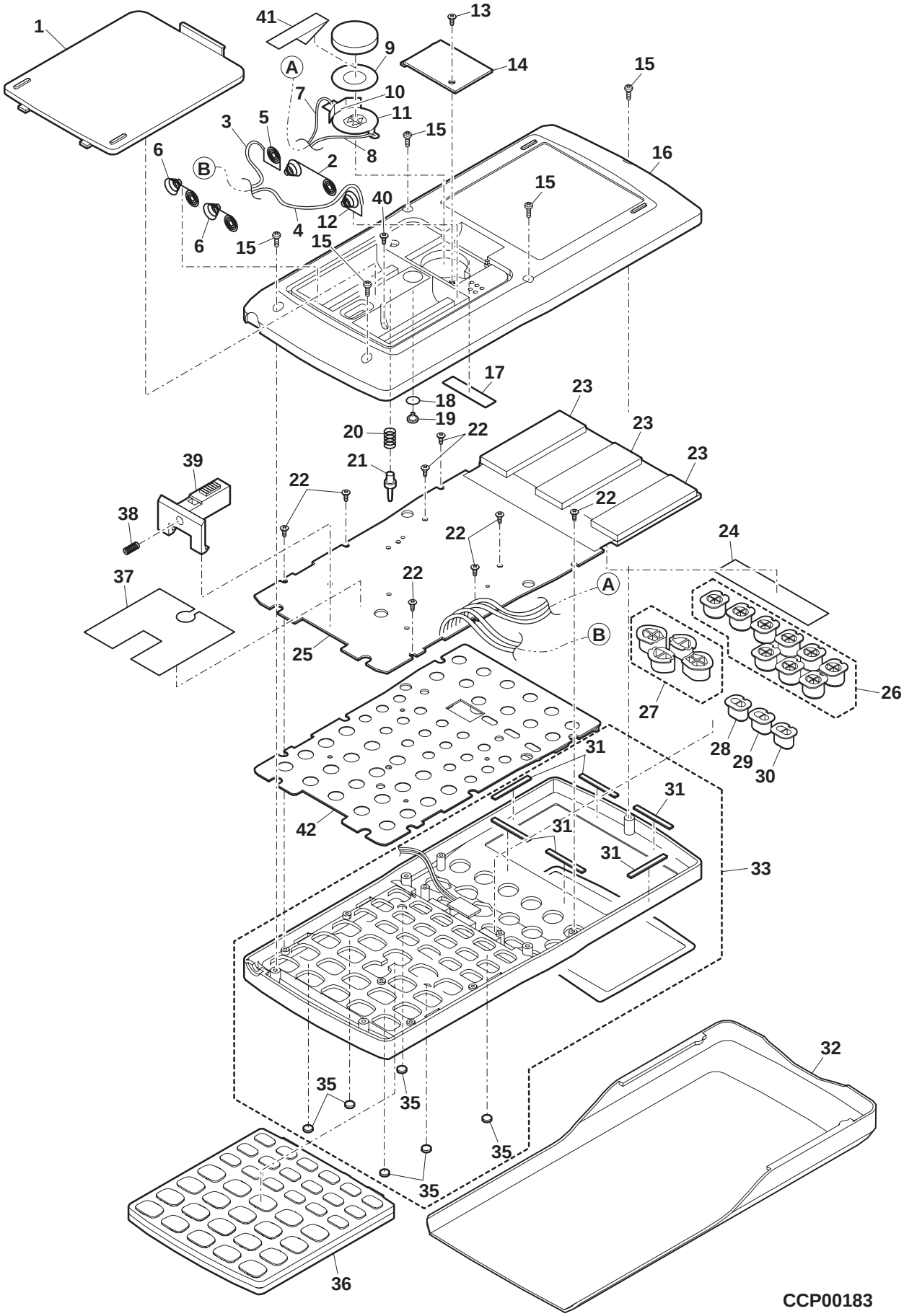


3-2. Pattern layout (Key side) (MP)



■ PARTS GUIDE

1 Exteriors



1 Exteriors

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	0GS613254 0//////	AE	N	D	Battery cover
2	0GS634658 0//////	AA	N	C	Battery spring 2(+ -)
3	0GS543260 0//////	AA	N	C	Lead wire for Battery(MAIN⊕)
4	0GS543261 0//////	AA	N	C	Lead wire for Battery(MAIN⊖)
5	0GS634641 0//////	AC	N	C	Battery spring 3⊕
6	0GS634639 0//////	AC	N	C	Battery spring 1(+ -)
7	0GS543256 0//////	AA	N	C	Lead wire for Battery(B/U⊕)
8	0GS543257 0//////	AA	N	C	Lead wire for Battery(B/U⊖)
9	0GS631648 0//////	AB		C	Battery spacer
10	0GS634642 0//////	AC	N	C	Battery terminal⊕
11	0GS634643 0//////	AC	N	C	Battery terminal⊖
12	0GS634640 0//////	AC	N	C	Battery spring 4⊖
13	0GS651154 0//////	AC		C	Screw(1.7×5) [for BACKUP BATTERY COVER]
14	0GS615274 0//////	AD	N	D	Battery cover for Back up battery
15	0GS651139 0//////	AA	N	C	Screw [for LOWER CAB]
16	0GS612015 0//////	AK	N	D	Lower cabinet
17	0GS631730 0//////	AA	N	C	Cover sheet
18	0GS617870 0//////	AA	N	C	Reset sheet
19	0GS553296 0//////	AC		C	Reset rubber
20	0GS634003 0//////	AB	N	C	Spring for Pop up knob
21	0GS615212 0//////	AC	N	C	Pop up knob
22	0GS681263 2//////	AA		C	Screw [for PWB]
23	0GS631718 0//////	AB	N	C	Cushion for LCD 1
24	0GS631720 0//////	AB	N	C	Insulation sheet(H/S)
25	0GSEL−99009 0//	BP	N	E	LCD+PWB unit(LCD+PWB+HMF) [Not include No.23]
26	0GS615223 0//////	AB	N	C	Key top(MODE)
27	0GS615224 0//////	AE	N	C	Key top(CURSOR)
28	0GS615227 0//////	AD	N	C	Key top(ALPHA KEY)
29	0GS615226 0//////	AD	N	C	Key top(2ndF KEY)
30	0GS615225 0//////	AD	N	C	Key top(ON KEY)
31	0GS631716 0//////	AB	N	C	Cushion for LCD 2
32	0GS612016 0//////	AK	N	D	Hard case
33	0GSEL−99007 0//	AW	N	D	Upper cabinet unit(UPPER CAB1+REVERSIBL KEYBOARD SW+SUB PWB+WIRE×2+DISPLAY PANEL+RUBBER CUSHION×6) [Not include No.31]
35	0GS631715 0//////	AD	N	C	Rubber cushion
36	0GSEL−99008 0//	AS	N	E	Reversible keyboard
37	0GS631719 0//////	AC	N	C	Insulation sheet(PWB)
38	0GS634644 0//////	AB	N	C	Spring for Slide knob
39	0GS615211 0//////	AC	N	C	Slide knob
40	0GS651154 0//////	AC		C	Screw(1.7×5) [for LOWER CAB]
41	0GS631014 0//////	AA	N	C	Batt.take of sheet
42	0GS553418 0//////	AG	N	C	Key rubber

2 Packing material & Accessories

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION	
1	0GS92015 40////	AW	N	D	Manual(ENGLISH)	[U1E,Y12,LL1]
	0GS92015 60////	AW	N	D	Manual(FRENCH)	[Y12]
	0GS92016 80////	AU	N	D	Manual(GERMAN)	[L1Q]
2	0GS93017 80////	AH	N	D	Gift box	[Y12]
	0GS93017 90////	AH	N	D	Gift box	[LL1]
	0GS93018 80////	AG	N	D	Gift box	[L1Q]
	0GS93019 00////	AG	N	D	Gift box	[LGN]
	0GS93018 90////	AG	N	D	Gift box	[L1N]
3	0GS94126 20////	AA	N	D	PE-bag	[Y12,L1N,LL1,L1Q,LGN]
4	0GS91836 80////	AB		D	Supplement sheet	[LGN]

3 LCD+PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION	
1	0GS42504 30////	BB	N	B	Flash(LH28F800BJE-PTTL90)	[IC2]
2	0GS42308 00////	AK	N	B	Regurator(RH5RE33A)	[IC5]
3	VHiTC7W04FU-1	AD		B	IC(TC7W04FU)	[IC6]
4	0GS41406 20////	AE	N	B	Schottky Diode(MA3X721)	[D1,D2,D7,D11]
5	VHD1SS355//-1	AB		B	Diode(1SS355)	[D3,D4,D8,D9,D10,D12]
6	VHDRB731U//-1	AE		B	Diode(RB731U)	[D5,D6]
7	0GS41107 21////	AD	N	B	Transistor(SST2907A)	[Q1,Q4]
8	0GS41300 90////	AD	N	B	FET(2SK2158)	[Q2]
9	0GS41212 61////	AC	N	B	Transistor(SST3904)	[Q3]
10	0GS20104 8M01TD	AA	N	C	Ceramic Capacitor(0.1µF)	[C1,C3,C5-C8,C13-C16,C27,C29,C32,C33]
11	0GS20105 8J01TD	AC	N	C	Ceramic Capacitor(1µF)	[C17-C24,C34]
12	VCCCCY1HH200J	AA		C	Capacitor(50WV 20pF)	[C11,C12]
13	VCCCCY1HH300J	AB		C	Capacitor(50WV 30PF)	[C25,C26,C28]
14	0GS22106 L600WE	AC	N	C	E-Capacitor(47µF/16V)	[C2]
15	0GS22107 JT00WE	AC	N	C	E-Capacitor(100µF/10V)	[C4]
16	VRS-CY1JD474J	AA		C	Resistor(1/16W 470KΩ ±5%)	[R2,R7]
17	VRS-CY1JD684J	AA		C	Resistor(1/16W 680KΩ ±5%)	[R3]
18	VRS-CY1JD564J	AA		C	Resistor(1/16W 560KΩ ±5%)	[R4]
19	VRS-CY1JD103J	AA		C	Resistor(1/16W 10KΩ ±5%)	[R5,R17]
20	VRS-CY1JD104J	AA		C	Resistor(1/16W 100KΩ ±5%)	[R6]
21	0GS15564 AB0100	AA	N	C	Resistor(1/16W 560KΩ ±1%)	[R8,R10]
22	0GS15474 AB0100	AA	N	C	Resistor(470KΩ ±1%)	[R12,R9,R11]
23	0GS15205 AB0100	AA	N	C	Resistor(2MΩ ±1%)	[R13]
24	VRS-CY1JD105J	AA		C	Resistor(1/16W 1.0MΩ ±5%)	[R14-R16,R26-R30,R32-R34]
25	VRS-CY1JD472J	AA		C	Resistor(1/16W 4.7KΩ ±5%)	[R18,R22,R23]
26	VRS-CY1JD0000	AA		C	Resister(0Ω 1/16W:1608(MCR03))	[R19,R40]
27	VRS-CY1JD680J	AA		C	Resistor(1/16W 68Ω ±5%)	[R20,R24]
28	0GS15161 CB0100	AA	N	C	Resistor(160Ω ±5%)	[R21]
29	VRS-CY1JD913J	AA		C	Resistor(1/16W 91KΩ ±5%)	[R25]
30	RMPTR4105 ACZZ	AB		C	Block resistor(1MΩ×4(1005))	[BR1-BR4]
⚠ 31	0GS36103 81////	AK		A	Fuse(CCP2E20)	[F1]
32	0GS34308 30////	AG	N	B	Ceramic Resonator(4.6MHz)	[X1]
33	RCRSP1007YCZZ	AE		B	Crystal(32.768KHz)	[X2]
34	0GS52503 40////	AE	N	B	Push Switch	[SW1]
35	0GS52503 50////	AE	N	B	Push Switch	[SW2]
36	0GS51413 51////	AH	N	C	Jack(3pin)	[JK1]
37	0GS31100 60////	AC	N	C	Chip Inductor(BLM11A471SG)	[L1~L3]
	(Unit)					
901	0GSEL-99009 0//	BP	N	E	LCD+PWB unit(LCD+PWB+HMF)	

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